

The Work of Bilingual Parent-Education Liaisons: Assembling Information Patchworks for Immigrant Parents

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In this paper, we examine the information work that bilingual parent-education liaisons perform to create connections towards assisting immigrant parents in the United States. As part of formal and informal educational institutions, liaisons operate between different social worlds—within and beyond the domain of education—to maximize immigrant parents’ engagement in their children’s academic lives. Drawing upon ethnographic fieldwork with low-income Latino immigrants and their liaisons, we explore how liaisons leverage technology, content, and people to align these worlds; bringing them closer to mutual understanding. We borrow inspiration from the analytical lens of seams suggested by Vertesi to explore how liaisons manage the “seams” between worlds. This analysis provides a rich and unique perspective of the work that successfully engages immigrant parents with their children’s education, as well as the tensions that challenge that engagement. This understanding of the work that liaisons do with and across seams provides insights to inform design directions for technology that could facilitate and amplify their efforts. Finally, we highlight how exploring the seams that liaisons work with can inform the field of Computer-Supported Collaborative Work (CSCW) on the role of technology in mediation.

CCS Concepts: • **Human-centered computing** → **Empirical studies in collaborative and social computing**.

Additional Key Words and Phrases: Immigrant Parents, Technology, Information Mediation, Seams, Liaisons

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1 INTRODUCTION

Claudia is 38 y/o mother of four who, as a Mexican immigrant in the United States (U.S.), has inevitably faced moments of tension when seeking support for her children. Four years ago, for example, one of her sons ran the risk of failing second-grade: he did not seem to care for reading, never turned in his homework, and avoided communicating with the teacher as much as possible. After trying everything she could with no significant improvement, Claudia fell into despair. Navigating systemic issues to get the help she needed became a daunting task. Claudia’s limited fluency both in English and the local culture diminished her chances to be taken seriously by the

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school staff. Looking outside of the school to find other avenues for support was also a hurdle: lack of transportation and affordable childcare limited the out-of-school learning opportunities she could take her son to. Further, her limited literacy, even in Spanish, and lack of familiarity with online searching complicated her possibilities of accessing other options for her son.

It was only when Claudia met Mariana, the school's bilingual parent liaison, that things radically changed for her. Hired by schools and out-of-school educational programs, liaisons like Mariana harness their bilingual and bicultural background to connect and collaborate with the multiple *worlds* that can support immigrant parents. Mariana, for example, talked to both school teachers and the principal to help Claudia file an evaluation request for her son. She also routed Claudia to online resources and to specialists that could help her learn more about assisting her child. Further, Mariana invited Claudia to a WhatsApp group that she created for Spanish-speaking parents at school, which gave Claudia access to a more diverse set of experiences. By mediating Claudia's interactions with the rest of the educational system, Mariana became instrumental in enriching Claudia's journey as an immigrant mom. Mariana's collaborative, information work, however, can be time- and skill-demanding, especially when having to serve an average of 300 parents, each with their own story and needs.

The increasing presence of immigrant families from lower-income countries in the education systems of higher-income ones has a potential to enrich schools with a diversity of experiences and background knowledge [6]. However, as Claudia's and Mariana's case illustrates, the inequities of these systems can complicate immigrant parents' ability to find and act on information for supporting their children [8, 17, 38], and adequate support is often needed. The fields of Computer-Supported Collaborative Work (CSCW) and Human-Computer Interaction (HCI) have increasingly explored parenting as a collaborative work [2, 4, 10, 40, 55], showing a growing interest in understanding the role that technology might have in the lives of parents positioned at the margins of mainstream society [20, 51, 61, 72, 92, 93, 95]. Work in this emergent area suggests a need to also unpack the structures that support parents' everyday work and explore potential roles for technology in enhancing their support [20, 61, 91, 92].

In this paper, we answer that call by reporting on the collaborative, information work of 16 *bilingual parent-education liaisons* in the city of Atlanta, U.S., who have been part of a larger, ongoing 2.5-year multi-sited ethnographic fieldwork on the information practices of low-income *Latino immigrant*¹ parents and the structures that support them. Specifically, we examine liaisons' creative work in aligning multiple—social and technical—worlds to provide a series of ad-hoc services to immigrant families, teachers, schools, and beyond. To understand liaisons' work bridging worlds, we draw inspiration from the analytical vocabulary of *seams* proposed by Vertesi [88]. She poses that contemporary environments of work entail a series of systems "lying in messy, and even unarticulated overlap" with each other, with visible seams acting as gaps between them. To meet their information needs despite the seams, individuals like liaisons, thus, must artfully assemble patchworks that temporarily bring systems' elements together.

Adapting Vertesi's approach to the seams across the social and technical worlds in which liaisons operate, we are able to offer a three-fold contribution to CSCW and HCI. First, Vertesi's emphasis on individuals' efforts in aligning a multi-world patchwork allows us to unpack liaisons' artful strategies, thereby illuminating their struggles as well as opportunities to amplify their work. Second, we offer a set of design recommendations we derive from those opportunities. Finally, we make a contribution to the scholarship on mediators by demonstrating how the lens of seams

¹In this paper we use pan-ethnic term "Latino immigrants" to refer to our foreign-born, Spanish-speaking immigrant participants from Latin American countries and their families. While we are aware this term homogenizes a diverse population with a variety of national backgrounds, cultures, classes, races, genders, and immigrant experiences, it is the one that most of our parent, liaison, and organization participants used to strive for unity as a community in the U.S.

and patchwork is allows to uncover: (1) the many worlds that mediators align; (2) the potential in these worlds' seams for further supporting mediators' work; and (3) the multiple—and often invisible—services that mediators offer to their many clients.

2 BACKGROUND: IMMIGRANT PARENTS AND EDUCATION

Immigrant families from lower-income countries, seeking a better future for their children, constitute the fastest-growing family group in schools across many higher-income countries [45, 68]. For these families to achieve their goal, they must learn new information that allows them to develop an understanding of the local education system, re-establish social networks, and acquire other forms of cultural capital (e.g., learning English) [7, 16, 54]. However, as immigrant parents attempt to do this, they often realize that the spaces for participation are not equitable: their intersecting differences from mainstream society affects their power to be heard [24, 87]. Limited familiarity both with the native language and the school system, for example, constrains the questions they might pose and the critiques they might make of schooling practices [16]. Also, cultural differences can drive teachers and school staff to misinterpret immigrant parents' actions as disengagement from their children's education [66, 75]. For example, many teachers struggle to find educational value in the cultural capital that immigrant parents activate to help their children (e.g., using stories of sacrifice to motivate their children and finding children a quiet workplace in overcrowded homes) [66]. Further, school staff often criticizes immigrant parents' lack of presence in schools with little consideration of the reasons that might prevent them from being there; long workdays usually leave these parents with no time to attend school events and feeling marginalized by the school and other parents often gives immigrant parents little motivation to participate in school activities [86].

Over the past 2.5 years, we have explored the role that technology might have in supporting immigrant parents [91, 92]. Specifically, we have studied the case of low-income Latino immigrant parents in the U.S. and their information practices as they relate to the education system. The context of Latino immigrants is a compelling one for illuminating design opportunities that can impact immigrant parents: they are increasingly interested in mobile technologies as a catalyst for learning [32], have a large presence in schools [14], and have historically held a difficult relationship with the U.S. educational system leading to an important academic gap between Latino children and their non-immigrant peers [13, 85]. Through ethnographic fieldwork engaging with over 300 parents, it became apparent that bilingual parent-education liaisons are a crucial support structure for immigrant families. From an immigrant background themselves, these liaisons are becoming increasingly common in school districts and out-of-school educational programs as they are hired to be a linguistic and cultural bridge between immigrant parents and the educational system [21, 42, 62]. Their ability to navigate multiple worlds (e.g., parents, teachers, school administration, supporting organizations, and technology) allows them awareness of the educational, cultural, and emotional information that each one of these actors produces and needs. This, in turn, enables them to put together information-based services to transform these information demands and offers into useful knowledge that can benefit immigrant families. In this paper, we look at the role that technology might play in helping liaisons in their collaborative work as they mediate information with and across multiple worlds.

3 RELATED WORK

The research presented in this paper is situated within HCI work on parenting and families positioned at the margins of mainstream society, in particular, within previous work on technology and immigrant families. Leveraging HCI literature, we define liaisons as *information mediators*, specifying how their work resembles and differs from earlier takes on the topic.

3.1 HCI and Immigrant Parents

Parents' ability to exchange information about learning resources with different actors—at school and beyond—is essential for ensuring children's academic success [7, 9, 17]. As described before, for immigrant parents, connecting with those who could provide the needed resources can be quite a challenge [16, 19, 38]. The fields of CSCW and HCI have increasingly explored how technology—especially social media platforms—might mediate parents' connection to information sources. Most of this work, however, has been with middle-class, native-born parents who use digital platforms voluntarily for a variety of social purposes such as building capital [46, 94], seeking social support [5, 55], accessing parenting resources [3], and constructing their parental identities [4, 80]. While research has documented the experience of immigrants with technology as they adapt to a new country [36, 43, 69], build communities [23, 37], and craft transnational online identities [59, 60], CSCW and HCI are just starting to understand the particularities of immigrant parents' relationship with technology.

Stemming from work in Media Studies, existing research with technology and immigrant families has centered on the impact of digital inequities on the parent-child dyad. These studies have explored the potential of parent-child joint media engagements to support learning [31, 49, 50, 56, 57, 81] and information-seeking [48, 72, 95, 95], suggesting teachers, school staff, older children, and other parents as key actors for motivating parents' use of technology for learning [47, 58, 70]. A recent but rapidly growing body of research has started to explore how these key actors bring technology—as well as information about other learning resources—closer to immigrant parents [20, 25, 26, 51, 90, 92]. The Comadre SMS system, for example, successfully leverages low-income, Latinx mothers' close-knit social networks to ensure that information about financially-accessible, out-of-school learning opportunities is disseminated across as many Latinx families as possible [20]. The work of Wong-Villacres et al. described the information networks of low-income, Spanish-speaking Latino immigrant parents, highlighting bilingual parent-education liaisons as one promising design target for augmenting potential benefits for parents [92]. In this study, we extend their work by examining the role of technology in supporting these liaisons' efforts to deliver information to immigrant parents. In doing so, this research demonstrates the value of studying parenting beyond parents, especially for parents with limited privileges and social status.

3.2 Bilingual Liaisons as Information Mediators

The goal of bilingual parent-education liaisons is to bring immigrant parents and institutions to a mutual understanding by acting as *information mediators*. Ehrlich and Cash explain that this type of mediator not only transfers information from one party to another, but establishes and maintains links between worlds via the creation, sharing, transformation, and use of knowledge [29]. In the case of liaisons, their everyday closeness with children and parents enables them to learn about families' emergent information needs, which can often go beyond the scope of education [42, 62, 78]. By leveraging this closeness as well as their in-between-worlds positionality, liaisons are able to offer multiple—and often impromptu—*information-based services* to parents and other actors (e.g., schools, supporting organizations). Further, they go outside the physical boundaries of their institutions to maximize opportunities for as many parents as possible [62]. While liaisons use technology to support their work, their mediation work does not revolve around it.

The fields of CSCW and HCI have a long tradition of studying individuals who, like liaisons, work in the middle of worlds. Often using the terms mediators, intermediaries, and brokers interchangeably, much of this work has focused on individuals who offer only one type of support—also referred to as *service* [27–29], usually technology-based [12, 28, 29, 65, 74, 76, 95]. Working in circumstances pervaded by resource constraints, Information and Communication Technologies and Development

(ICTD) research, for example, has extensively explored the *technology intermediary* [33, 63, 65, 77], whose service is to intervene “when the primary user is not capable of using a device entirely on their own.” [76] When looking at information mediators, work on CSCW has tended to put an emphasis on mediators operating in contexts that heavily restrict the nature of the services they can provide (e.g., mediating e-government online services [27, 28], supporting staff at telecenters [74] or digital libraries [29], and children seeking information for parents [95]). This body of work has focused on mechanisms that information mediators use to ensure that those they assist—also referred to as *clients* [27–29]—can access and make sense of information. Some of these mechanisms entail defining information queries for clients [11, 29], developing technological abilities [27, 73], and educating clients to become information-seekers themselves [28, 29]. This work’s general assumption—with few exceptions [27]—has been that mediators operate when clients approach them with specific requests. That is not the case for liaisons, who, due to structural issues affecting parents’ relationship with mainstream institutions like the school, often struggle to reach out to parents and offer them information-based services [62].

Using the case of liaisons, in this paper, we explore the work of information mediators who (1) offer multiple information-based services to multiple clients; and (2) must make additional efforts to convince their clients to use their services. While the liaisons we studied do not necessarily use the term *clients* to refer to the different actors they provide services to (e.g., parents, schools, supporting organizations), we choose to use the term for it highlights that liaisons’ main goal is to satisfy the information needs of others [79]. Examining the work of liaisons as service providers, we describe the resources that liaisons must leverage to maximize their clients’ access and use of information. Further, we explore the tensions and challenges this type of mediator can face when serving multiple clients from different backgrounds.

4 THEORETICAL LENS: THE ANALYTICAL LANGUAGE OF SEAMS

To examine liaisons’ mediation work, we borrow from Vertesi’s analytical vocabulary of *seams* [88]. Focusing on physical and digital infrastructures, she proposed this language for understanding “how and where actors make connections and bring disparate elements together” for operating in multi-infrastructural environments. Vertesi posits that, in these environments, infrastructures (e.g., *Facebook*, *Twitter*, Phone 3G coverage) often lie in a messy overlap with each other. Drawing on critical studies on Ubiquitous Computing [18, 89], she explores the gaps between these infrastructures (the infrastructures’ seams). Infrastructures, she explains, are often designed to make their seams invisible, providing a seamless experience to individuals moving across these systems. In practice, however, the seams are exposed, producing a seamful experience where incompatibility and limitations remain a central part. For Vertesi, it is how individuals react to the seams what becomes essential to understand when looking at multi-infrastructural situations. In particular, she proposes to look at how, instead of seeing seams as problems, people creatively use them as opportunities to align a fleeting multi-infrastructural patchwork for meeting information needs.

We argue that liaisons also operate in a heterogeneous, messy environment. Instead of operating across multi-infrastructural environments, however, liaisons work in the middle of multiple, non-conforming social and technical *worlds* (e.g., that of Latino and American parents, teachers, school staff, communication technologies, and so on). Similar to the infrastructures that Vertesi describes, these worlds lie in a messy overlap with each other, with their seams visible between many edges (e.g., the worlds of parents from different ethnicities and origins overlap at schools, with cultural, linguistic, and socioeconomic differences at their seams). To analyze liaisons’ work, we thus adapt Vertesi’s language of seams from a technological to a fundamentally social domain—such as the educational environment. While exploring liaisons as *boundary objects* across intersecting social worlds [82] may have been an option of analysis, such perspective ran the risk of disregarding

liaisons’ agency and creative work when bringing worlds together. By holding our focus on the seams instead, Vertesi enables three analytical opportunities for our work. First, it helps us to uncover liaisons’ struggles and points of mastery as they assemble multiple services for helping their clients to overcome seamful experiences. Second, it unearths the many services that liaisons assemble, including those often invisible to institutional actors. Finally, it reveals limitations and possibilities of existing worlds to support liaisons’ work. In doing so, this lens augments our opportunities for devising technology roles that support and amplify liaisons’ capabilities.

5 METHODOLOGY

In this paper, we analyze the collaborative, information work of 16 liaisons recruited as part of a larger, 2.5-year multi-sited ethnographic fieldwork. The goal of that research engagement has been to explore possible roles for technology in supporting Latino immigrant parents as they access and make sense of learning-related information. The fieldwork is still taking place across 16 locations in the city of Atlanta, U.S., and has included the participation of over 300 parents as well as other actors like teachers, and members of supporting organizations. As our participant parents increasingly highlighted liaison’s key role in providing resources to support their children, we realized there had been little research on liaison’s role and decided to give a more in-depth look at this particular actor. We recognize that the analysis offered—stemming from liaisons’ situated knowledge—tells one-side of a complicated story. We have tried to minimize such risk by juxtaposing liaisons’ experiences with other actors’ accounts collected throughout the larger study.

Participant	Gender	Age	Country of Origin	Organization
Mariela	F	45-50	Ecuador	Elementary School
Inés	F	35-40	Venezuela	Elementary School
Gabriela	F	35-40	Colombia	Elementary School
Marisa	F	35-40	Bolivia	Elementary School
Dianne	F	35-40	United States	Elementary School
Gisela	F	45-50	Puerto Rico	Elementary School
Chabela	F	45-50	Chile	Middle School
Mireya	F	45-50	Colombia	Middle School
Tara	F	45-50	Honduras	High School
Ernesto	M	35-40	Puerto Rico	Parenting Program
Mayra	F	45-50	Venezuela	Parenting Program
Juana	F	20-25	United States	Parenting Program
Deborah	F	30-35	United States	After-school Program
Diana	F	35-40	Cuba	After-school Program
Alicia	F	35-40	Dominican Republic	After-school Program
Morelia	F	45-50	Mexico	School District

Table 1. Details of liaisons’ gender, age range, nationality, and organizations (all names are pseudonyms).

We recruited 16 liaisons at 14 of the 16 locations of our multi-sited ethnographic fieldwork. Locations included eight Title I schools, the ESOL (English to Speakers of Other Languages) department of a school district we will call Lakeside, and five NGO (Non-governmental organization)-run educational programs (three after-school programs targeting children and two programs targeting parents). Participant included 9 school liaisons, Lakeside’s head of bilingual liaisons, 3 liaisons of after-school programs, and 3 liaisons of educational programs for parents. All recruited liaisons are professionals from different countries of origin, with a minimum of a bachelor degree in different specializations (e.g., psychology, education, industrial management, and business). All of them have over four years working as liaisons, in-depth knowledge of the school community, and use basic office software and social media. The majority are female (14 of 15)², speak Spanish

²The gender bias in our sample is representative of liaisons’ gender at the school district we studied. The large presence of female liaisons might be due to the job’s alignment with working mothers’ needs. Most liaisons reported initially taking the job because it allowed them to see their children at school and take vacations at the same time their children did.

either natively or as a second language (14 of 15), and are of ages ranging from 25 to 48 with an average age of 39. Recruited liaisons serve from 120 to 600 parents with an average of 300. The parents served are from a low-income background; most are from countries like Mexico, El Salvador, Guatemala, Honduras, with fewer from Venezuela and the Caribbean. A detail of participant liaisons’ demographics can be found in Table 1. Other participants and locations of our larger, ongoing study are described in [92].

Our data collection process has entailed four distinct time periods and a wide range of qualitative methods (e.g., semi-structured interviews, informal conversations, and participant observations). The goal of the three first periods was to acquire a holistic view of the factors enabling or hindering parents’ access to learning-related information. From 1/17 to 5/17, we studied a Title I³ elementary school at Lakeside district. To recruit parents who did not attend school functions frequently, we visited Solidaridad and Alianza Religiosa—two supporting organizations targeting low-income Latino immigrant families—and one after-school program (8/17-12/17). The accounts of parents collected in this period highlighted liaisons’ crucial role in influencing parents’ access to information. To further understand liaisons’ work, from 1/18 to 5/18, we visited the head of Lakeside’s liaison staff, four Title I schools that she recommended studying, and four NGO-run educational programs targeting Latino immigrant children and/or their parents.

Time	Location	Methods	Participants	Hrs
1/17 - 5/17	Lakeside school district: 1 elementary school (40% LS ⁴)	Interviews	8 teachers, 1 school liaison, 9 parents	50
		Participant Observations 1 International night (Attending), 1 Parent-liaison session (Attending), 4 Parent-teacher conf. (Translating),	50 parents	
8/17- 12/17	Across the city: Solidaridad, Alianza Religiosa, 1 after-school program (100% LS)	Interviews	21 parents , 3 prog. coord., 1 prog. liaison	120
		Participant Observations 1 Computer Workshop (Teaching), 2 College Fairs (Volunteering)	120 parents	
1/18 - 5/18	Lakeside school district: ESOL department, 2 elementary schools (62% and 93% LS), 1 middle school (48% LS), 1 high school (37% LS) Across the city: 2 after-school programs (100%,70% LS), 2 parenting prog. (100% LP ⁵)	Interviews	1 ESOL staff, 5 school liaisons, 4 program liaison	20
		Participant Observations 1 Parenting Workshop (Attending)	120 parents	
1/19 - 3/19	Lakeside school district: 2nd visit to ESOL department and to elementary school (62% LS), 2 elementary schools, (76%, 29% LS), 1 middle school (35% LS) Across the city: 2nd visit to after-school program and to parenting program	Interviews	1 ESOL staff (2nd visit), 1 school liaison (2nd visit), 2 prog. liaison (2nd visit), 3 school liaison	20
		Participant Observations 1 Technology Workshop (Teaching)	11 parents	

Table 2. Details of data collection periods, including locations studied, methods used, number/type of participants, and hours invested

We analyzed data collected up to this point to obtain an overall view of parents’ supporting structures in terms of information management and reported the results. The analysis suggested liaisons as a key point of intervention to further support parents [92]. To validate our design insights (1/19-3/19), we met with four of our former liaison participants (Lakeside’s head of bilingual liaisons, one school, and two program liaisons) and concluded that: (1) to devise design technology-enhanced

³Title I is a federally funded program in the U.S. that provides financial assistance to public schools with high numbers of students at risk of failure and living at or near poverty [71].

⁵LS: Latino students (foreign- and native-born)

⁵LP: Latino immigrant parents

interventions for supporting liaisons' work, we needed to re-analyze of our data focusing on liaisons' experiences; and (2) to validate that we had reached data saturation on liaisons' work, we needed to interview liaisons with fewer resources and administrative support than those we had already studied. Guided by the head of liaisons, we interviewed three more liaisons with those characteristics. This led us to data saturation. Throughout our fieldwork, we also observed and participated with parents and liaison as they interacted across different schools and NGOs-run events. Details of our data collection sites and methods are found in Table 2.

Interviews with liaisons lasted 45-90 minutes and took place in participants' language of preference. The data we collected was in the form of field notes and audio recordings, which we transcribed, and translated. Following an inductive and interpretive process, and factoring the perspectives from the different actors we recruited, we coded our data thematically, identifying emerging patterns relevant to liaisons supporting tasks (e.g., 'tailoring information to ensure parents act on it,' 'empowering parents to overcome their fears,' 'training teachers to understand parents'). The data under these patterns suggested that each task demanded to assemble a patchwork of selected pieces from different social and technical sources. For example, the data under 'tailoring information to ensure parents consume it' described liaisons' online and offline search for information satisfying parents' needs, their selection of technologies for crafting compelling messages, and their follow-ups to ensure that parents used the new information. To describe this assembling work, we turned to Vertesi's analytical language of seams, which seeks to understand how individuals connect multiple worlds to achieve information goals. Using this language as a lens, we coded our data again, now focusing on identifying: (1) liaisons' information goals and the worlds they work with to achieve them; and (2) the seams across worlds and how liaisons harness them or fail in their attempt.

6 FINDINGS

Using Vertesi's approach, we are able to provide an in-depth account of two aspects of liaisons' work. First, we describe the main types of services liaisons are able to provide by creatively aligning elements from the worlds of parents, technology, school staff, and supporting organizations. Second, we examine the role of technology, information, and social capital in enabling many liaisons' alignment work as well as limitations that prevent other liaisons from fully harnessing these elements. In doing so, our findings highlight how liaisons transform information, helping actors from multiple worlds to make sense and act on it.

6.1 Offering Multiple Services: Different Roles, Worlds, and Goals

Previous work on education has highlighted services that liaisons undertake to translate cultural differences between parents and schools [78, 83]. The analytical lens of seams allows us to provide an information-based view of these services, revealing the specific alignment strategies each entails. First, liaisons perform communication work, translating information between parents, educational institutions, and other worlds. Second, they foster the sharing of lived experiences across instructors, supporting organizations, and parents, working towards the creation and maintenance of education-based communities. Finally, liaisons act as capacity builders for parents, school staff, and supporting organizations. We now describe these different services, including liaisons' efforts to assemble patchworks that can enable these services to operate as seamlessly as possible.

6.1.1 Parent-Institution Communication. One of the primary activities a liaison is expected to perform is helping bridge the everyday communication between their institution and Spanish-speaking parents. This entails services such as translating documents, functioning as interpreters during parent-instructor meetings, and helping institutions distribute announcements (e.g., reminders that classes were canceled). Seams in their environment, however, drive liaisons to draw elements from

different worlds to patch a communication solution. Mireya, a middle-school liaison, for example, noticed Joaquin, a 10 y/o, was too quiet during parent-teacher conferences. Unlike the school's teachers, she was able to directly ask the mother about it. After finding out the child's father had been deported, Mireya decided to take the matter to the social worker and the school counselor for devising a plan to help the child overcome a potential case of depression.

Technology is one world that often impacts how liaisons patch these sort of solutions. To convey a sense of equality to parents, U.S. schools tend to standardize the media they use to send information, often relying on emails, Facebook groups, and websites for that purpose. This action, however, can be a detriment to many low-income Latino immigrant parents who tend to not use those technologies for learning about their children's education [47, 92]. For Ximena, a Mexican mother of four who we met in a computer workshop, for example, the school's decision to use email—a tool she was just learning—led her to miss a notification about her son's recent detention.

Acknowledging the seams between parents and these media, Mireya decides to patch parents' world with a non-technological option; she prints out school announcements in Spanish, distributes those to religious organizations, and asks the organizations' leaders to let her make an announcement at the end of Spanish services. Most liaisons, like Gabriela, complement such offline channels with their own private, Spanish-only, online ones, which they align with school-sanctioned technological platforms. She explains further,

We have a WhatsApp group only for our parents [referring to Latino immigrants]. I usually send them information in Spanish about events that the school has previously announced in the newsletter, 'cos they don't read that one. Sometimes I also pass along posts from PTA [Parent Teacher Association] members on the school Facebook page requesting help for their events. When I send this information, there's more of a chance that they read it, and since they trust me, there's more of a chance they actually volunteer to help.

Liaison-created *WhatsApp* groups were in fact one of the sources of information that the parents we talked to outside of schools deemed as extremely useful. Liliana, a Mexican mother of three that we interviewed at Solidaridad, explained to us: "We [Latino immigrant parents at the school] are all in a WhatsApp group that the liaison created. Thanks to it, I don't miss a thing [about school activities]." Both Gabriela's and other parents' accounts suggest that the autonomy to select technologies that fit the practices of non-English-speaking immigrant parents is key for the success of liaisons' communication services. In this way, liaisons avoid imposing new communication practices on parents. In addition, choosing communication technologies that parents use on an everyday basis, helps liaisons build and maintain trust with parents, which liaisons later leverage into greater influence on how parents make sense and act on information.

6.1.2 Community-Building via Fostering the Sharing of Lived Experiences. Mediating the communication from institutions to parents is a first step for including parents as active members of U.S. schools. However, this does not foster the two-way communication that can help parents build community with educational institutions [34, 44, 90]. Liaisons, thus, draw different elements from the social worlds around them (e.g., other parents, teachers, school staff, and supporting organizations) to assemble a multi-cultural patchwork for helping parents to interact with other actors. This is not always an easy task. Across out-of-school locations, parents told us they saw no point in attending school meetings with other parents for those were often in English, a language most of them do not speak. Indeed, due to a desire to work towards equity and inclusion, many of the administrators of the schools we visited asked liaisons to organize all events for school parents in English, and to give translation earbuds to Spanish-speaking parents. This is the case of events like the school open house, international night, and a day for families during the Hispanic Heritage

Month. Chabela, a middle-school liaison, explains how this decision impacts Latino immigrant parents:

“Los padres americanos” [referring to non-immigrant, English-speaking parents] and our parents [referring to Latino immigrants] sit down next to each other, and we give our parents earbuds and get as many translators as needed, but there’s no conversation going on amongst them. It’s even worse, ’cos when we ask parents if they have any questions, our parents don’t raise their hands. They just don’t feel comfortable enough.

When liaisons have the freedom to assemble spaces that are specifically for Latino immigrant parents, the opportunities to foster richer experience-sharing moments across actors are much higher. During our observations of a large college fair for Latino immigrant families that Diana, a program liaison, annually puts together, we were able to see these exchanges in action. The panelists’ earnest accounts of their experiences with U.S. schools and colleges motivated Francisco, a father who had recently immigrated to the U.S. with his family, to express his deepest concerns about his children’s future. Visibly moved by the situation, he shared his undocumented status with the audience and his fears that his decision to emigrate would curtail his children’s opportunities to go to college. Many panelists and members from the audience then rushed in to give him all kinds of advice, including specific websites to visit for information on options like high-schools’ Advanced Placement programs, and so on.

These rich moments for sharing experiences can also impact organizations trying to target Latino immigrant families. Thanks to Diana’s annual event, the organizations that go to her fair (e.g., college recruiting staff, after-school STEM programs), now know what material to bring to inform Latino immigrant families about their options. Likewise, these organizations now make an effort to send bilingual staff to these events. The tailored patchwork that Diana assembles, thus, helps organizations get closer to the information needs of immigrant parents.

For parents like Rita, who are able to attend schools with regularity, having access to spaces at schools like the one Diana assembled is of utmost importance: “We need to be here with the ’americanos’ [referring to non-immigrant, U.S. citizens], it is only by coming together and speaking up that we can start changing things around here!” School liaisons are cognizant of this need, but lack program liaisons’ freedom to act. They, thus, are forced to resort to more creative means to assemble spaces for community-building. Some school liaisons have worked to exploit seemingly contradictory seams between Latino immigrant parents, non-immigrant English-speaking parents, and the school staff to assemble patchworks where there is no other option but to exchange information.

Gabriela, for example, leveraged a critical issue for parents to create a moment of information exchange between parents and the school’s non-Spanish-speaking principal. During a time the country was transitioning to a government openly against non-documented immigrants, she noticed parents becoming increasingly desperate for information about how to protect their families. She then used this moment as an opportunity to bring the principal—who had not worked with Latino immigrant families before—closer to the everyday issues of the Latino community. She supported him in overcoming the language barrier and getting close to these parents:

He was very unsure to do it because he doesn’t speak Spanish, but I told him that he was the only one they were going to listen to. He went in, and had a frank conversation with them, listened to their concerns, and answered their questions, reassuring them that the school was a safe place for them and their children.

Inés, on the other hand, used parents’ mastery in Spanish, and English-speaking parents’ interest in learning this language, as an opportunity for aligning these two disparate worlds. For this, however, she had to also leverage her own mastery in Spanish, English, and even technology.

Some of the mothers of the PTA told me that they wanted to learn Spanish. I then invited them to the weekly computer classes that I teach to Latino [immigrant] parents and prepared material for the class with questions and answers in both languages so that they had to communicate with each other. It was an incredibly rich experience for everybody. Sadly, the PTA parents couldn't attend anymore, so I went back to my regular classes.

The literature on technology and parents from a low-income background has highlighted that existing parent-school communication technologies are not providing equal opportunities for all parents to participate [25, 90]. Liaisons' community-building efforts suggest that technology might only be able to do this by enabling community-mediators to walk along with all actors, helping them to overcome cultural and social differences.

6.1.3 Capacity-Building. For parents to access and make sense of learning resources, they must strengthen their ability to navigate their host world on their own. Likewise, for institutions like schools and supporting organizations to cater to the needs of immigrant families, they must learn best practices in the matter. Liaisons work towards ensuring that their clients (parents, instructors, school staff, and out-of-school organizations) can become self-reliant navigators of different worlds.

Unlike the mediators that previous research has studied [28, 74, 76, 95], liaisons' capacity-building work is not constrained to a particular service (e.g., education), but expands its scope based on what their clients need to learn in order to realize their aspirations. Alicia, an after-school liaison, explains the varied nature of liaisons' capacity-building activities: "We are trying to educate the community in different fields like nutrition, schooling, health, things that will benefit them, and indirectly, will benefit their children." The capacity-building topics that we saw in our data, thus, ranged from classes about filing taxes to instructions on emailing teachers.

Creating such wide variety of capacity-building opportunities demands liaisons to be highly skilled in identifying their communities' learning needs. Further, it requires them to assemble a patchwork of elements for devising and implementing the right solutions. Mireya, for example, had observed parents having difficulties disciplining their children. Remembering that her supervisor had introduced her to Ser Familia, an NGO for helping Latino immigrant families to cope with the emotional consequences of immigration, Mireya reached out to them to ask if they could offer her parents a workshop about family communication. For parents like Betty, a mother of four, this initiative turned out to be life-changing:

My youngest was becoming hard to control, she was throwing tantrums and she got worse when we gave her a cellphone. I must admit I was too harsh when disciplining her. Thanks to the workshop that Mireya organized, I learned how to manage my temper, and to set up rules at home so that each kid becomes responsible for the family's well-being. That has helped us a lot.

Both parents and liaisons highlighted how they see technology as an essential topic for parents to learn. Ruben, a parent attending a technology workshop that Gabriela organized, told us "we Latinos do not use technology the same way 'los americanos' [referring to non-immigrant U.S. citizens] do. I mean, we use it a lot but not for so many purposes as they do. Because of that, we ended up missing out on many things that could benefit us." Chabela also feels, as many other liaisons do, that technological skills are essential for parents to effectively support their children: "I am a firm believer that giving parents the chance to learn how to use the technologies we use at school can empower them to effectively manage their children's academic situation."

Assembling patchworks for building parents' technological capacity, however, is not easy. Parents' wide range of technical skills complicate the decision of what content to teach. Moreover, technology's fast development make it difficult for liaisons to find the right teaching aids. Gabriela explains: "Nowadays children know everything about technology and our parents are concerned

that they stay powerless to control their use. I have been searching who can teach a class about parental controls, but I have not found anyone yet.”

Through capacity-building activities liaisons also impact worlds outside of their institutions. By participating in these activities, supporting organizations, for example, learn how to deliver educational services more effectively to immigrant parents. Deborah explained this further:

This organization gave free tablets to our parents, and this included three training sessions to teach them how to use it for school communication purposes. Even though the lady who was teaching the session was Mexican, parents had major issues in connecting with her. She was insisting on the importance of checking emails, but then again, if you cannot read [referring to parents], what sense does it make? We never got to the third session, and after that experience, the organization decided to revise its tablet program.

The parents we talked to wanted to learn more about how to use technology to impact their children’s education and family’s well-being. As we saw, liaisons have the power to address this need. However, they require the appropriate support for finding the right elements to patch so as to offer successful capacity-building services on the topic.

6.2 Leveraging Technology, Content, and People as Alignment Tools

When aligning worlds to offer multiple services, liaisons face a series of challenges that limit their capacity to make an impact. Our interviews with liaisons and our observation of their everyday work suggest they heavily leverage technology, information, and people as alignment tools for managing these challenges. We now describe how liaisons use these tools, and well as the opportunities and limitations these entail for liaisons’ work.

6.2.1 Using Technologies to Assemble Patchworks. Technology plays a significant role in supporting the various services that liaisons offer. With different degrees of mastery, we found that all liaisons engage in searching, evaluating, and tailoring technologies to ensure that, instead of being a hurdle, technologies augment different actors’ capacities. Moreover, liaisons conduct different following-up activities to make sure parents are making the most out of these technological opportunities.

As Wong-Villacres et al. found, oftentimes the technology that schools and teachers suggest for parents fails to engage immigrant parents [92]. Liaisons are often the first to notice this gap and the impact that it can have in parents’ ability to help their children. Moreover, their closeness to so many different actors allows them to evaluate the seams between technologies and parents, and conclude why they are not aligning. Alicia, for example, explains why *CallingPost*, the automatic phone call system her after-school program used, worked neither for parents nor for the program staff:

Right after parents got an automatic phone call, they would call back, asking for clarification, even when the call was in Spanish. Calls were too fleeting for our parents, they could not remember all the details. We had to switch to something else, we just don’t have enough staff to support so many calls!

In such situation, many liaisons searched for other possible technology options that could align to the reality of all actors involved, including their own. This often leads liaisons to engage in a trial-and-error process that can take time, and more importantly, can be highly contextualized. For example, Gabriela tried *Remind* but found it did not fit her particular communication practices; she prefers to send long, more detailed texts to her parents. Thus for her, *WhatsApp* was a better option.

To avoid impacting parents with trial-and-error processes, some liaisons like Mayra engage in a more detailed search and assessment process. As the liaison of a parenting program, she wants parents to use technology for learning ways to stimulate their children’s development. Over our

interview, she showed us three options for apps she had found on the web. She was trying them out herself before deciding which one to recommend to parents.

Despite liaisons' efforts to find the right technological patch, their freedom to choose and align parents with technologies can be deterred by institutional regulations. The school district's decision of not giving liaisons an institutional cell phone to work with, for example, highly restricts liaisons' opportunities to try new technologies. This leads many liaisons to reject apps like *WhatsApp* that require them to use their own phone number. Institutional agreements with software providers can limit liaisons' alignment attempts. In Deborah's case, this forces her to use the *Trumpia* SMS system her organization bought, even though it does not support Spanish characters and accents.

Our conversations with parents in out-of-school locations highlighted that liaisons can also be a key support when school introduces new technologies to parents. When asked about school technologies, many confirmed having received the assistance of their school's liaison for installing at least one school-related app. Ensuring that parents have access to these technologies requires liaisons to engage in intensive follow-ups with parents. Most of the liaisons in our study do this through one-on-one, highly personalized interactions with parents where they scaffold technology use for them. As Gabriela explains, follow-ups often stem from casual conversations:

I usually talk to parents after parent-teacher meetings and it is then when I usually find out parents need more help with technology. Last week, for example, a mom told me the teacher had asked her to use ClassDojo, so I asked her, 'Do you have it?', and she didn't, so I took her phone, installed it, and then taught her how to use it.

Other times follow-ups stem from liaisons' explicit tracing of parents' use of new technologies. After realizing that few parents in her program were using the platforms she recommended, Mayra asked them about it and learned that many had issues finding the text box to input their login information. She then taught each one of them how to overcome that problem.

By providing parents with operational knowledge for using school apps, liaisons' follow-up activities resemble *proximate translators*, a type of technology intermediation that Sambasivan et al. describe for ICTD contexts [76]. These intermediaries and liaisons, however, differ in their end purpose. Proximate translators' goal is to provide end-users with knowledge of basic functions without showing them how to proceed beyond that; end-users' low-literacy levels and infrastructural limitations in that context often hinder the intermediary's ability to aim for more. Interventions leveraging these intermediaries, thus, often lack support for end-users to extend their knowledge about a piece of technology [1, 63]. Given that many of the immigrant parents that liaisons serve do have basic reading skills and regular access to mobile technologies, liaisons aim for parents to eventually become self-reliant technology users. Liaisons' work suggests an opportunity for expanding ICTD's intermediary-based interventions to include support for learning beyond the basics. Likewise, interventions to support liaisons could learn from intermediate use in ICTD context, and enable liaisons to conduct follow-ups on parents with lower literacy levels.

Teachers are relevant important curators of technology for children [32]. Our findings suggest that, for parents, it is also relevant to look at liaisons' ability for curating technology and that liaisons might need more support in navigating institutional, scalability, and parents' literacy limitations.

6.2.2 Tailoring Actionable Information. All the services liaisons provide require parents to not only make sense but to make use of new information. As information mediators, liaisons work hard to support parents in this process, often transforming information for them [29]. The social seams between low-income Latino immigrant parents and the mainstream worlds they interact with, however, complicate liaisons' efforts. In particular, personal and structural factors like fear of deportation, mistrust towards dominant institutions, language differences, and social discomfort

prevent many Latino immigrant parents both from relating to new information and from using it to advance their future [19, 38]. The lens of Vertesi allows us to uncover additional services liaisons provide for managing these seams such as editing information to make it more appealing, marketing the events they organize, and following up on parents' use of information.

Conveying information to parents about how to support children's academic life is a moment of alignment for liaisons; they have to assemble a patchwork that brings two very different worlds together. To do this effectively, we observed liaisons exploiting the seams between the educational system, Latino immigrant parents, and their own bi-cultural knowledge to—as many of them put it—“meet parents where they are.” This often entailed speaking in a way that resonated to what parents already know (e.g., using culturally-relevant sayings/jokes to achieve common ground). It also meant knowing when and how to switch to an authoritative demeanor. Mariela, for example, was usually cheerful when interacting with parents. However, she became more serious and imposing when explaining to parents how important it was for them to make sure their kids kept studying over Summer. For Gabriela, Marisa, and Gisela this was a matter of being able to tell parents “las cosas como son” (similar to the English idiom “I won't sugar coat things”) so that parents could take action based on accurate information. Gisela explained further:

Last week, I had a meeting with a father who was adamant that it was the school's problem, and not his, to deal with his child's academic issues. I had to be very direct with him, to the point that we ended up engaging in a very heated argument, but it was worth it. At the end, he realized that he also had a role in helping in his child's school life, and told me 'we need more people like you who tell us things as they really are'.

The account of Efigenia (a mother of four) suggests, however, that, on its own, an authoritative tone is not always effective in communicating with parents. Liaisons need to also maintain a respectful tone for ensuring parents are not offended: “for a while I literally avoided going to my child's school cause the liaison there was too rude when addressing parents, a lot of us [Latino immigrant parents] would rather not approach her.”

In Latin American countries, historical classism that places value on education and origin—rather than on income alone [53]—often drives parents to hold high levels of respect toward teachers and school staff and, thus, to deem them as authority figures [39]. Liaisons' tone-switching behavior suggests that, as bicultural individuals, they are aware of this perspective and leverage it to become more effective in transforming information from the school to parents. Further, it highlights the cultural expertise needed to successfully convey school-related information to immigrant parents.

When sending information to parents via technology, liaisons use other mechanisms to achieve a direct, and yet respectful tone. Noticing parents' lack of familiarity with processing excessive information, most liaisons minimize the information load. Alicia, for example, avoids sending long pdfs with new information to parents. Instead, she leverages her knowledge of editing tools to create short visual messages with summary points of what the pdf is about. Likewise, for a while, she also put great effort into tailoring the content of online resources for parents:

I tried not to send them only links, 'cos I knew that [even] if they clicked, they wouldn't have enough time to read the information. So, I took screenshots of the most important articles and sent those to them instead. The problem was that some articles were too long to fit in a readable screenshot, so I had to edit it, and it was too much work, so I stopped.

Not all liaisons put so much effort in tailoring the messages they send to parents; not all of them have the skills nor the time to do it. However, Alicia's work exemplifies what it takes to share online resources in ways that parents find actionable.

Liaisons also engage in extending the effectiveness of the patchworks they assemble for offering community- and capacity-building services. Despite liaisons efforts, attending activities outside

their home can be a burden to many low-income Latino immigrant parents: they have to work long hours, have many children to take care of, and usually do not have easy access to transportation [16, 19, 38, 87]. Liaisons, thus, engage in more assembling work to lower participation barriers. Inés tries to organize her events at hours when parents are often available and, if possible, in out-of-school locations that are closer to parents' homes. Moreover, she assembles a motivational patchwork to align her events with parents' needs. For example, she leverages her connection to local business to get free food that she can offer over her morning workshop with parents so that they have one less thing to worry about. Knowing that transportation can be another significant constraint for parents; liaisons like Gabriela and Mariela usually ask parents who have cars to carpool, frequently offering their own cars to ensure parents can attend to their events.

Aligning worlds to increase motivation for parents, however, is not an easy thing to do for all liaisons. It requires them to be very creative and well-connected to their environment. The latter is not as feasible for liaisons who work in low-resource neighborhoods where it can be hard to find organizations willing to help. Similarly, not all liaisons are familiar with diverse online resources in Spanish and have minimal opportunity to exchange knowledge about this topic with others. The lack of support from school administrators and/or parents from other cultural and linguistic background—especially parents native to the mainstream culture—can greatly constrain liaisons' willingness to craft motivational patchworks. Gisela shared with us how the high presence of Latino immigrant families in her school (76%), was not enough for convincing the PTA (Parent-Teacher Association) to include parents in the organization of their events:

With my parents, we wanted to organize a fund-raising event where other Latino [immigrant] parents could participate, so we thought of organizing a raffle 'cos that's a very common activity for us Latinos. The other parents [referring to non-immigrant, English-speaking parents] didn't agree; they thought there were other ways to raise way more money. The thing is that our parents usually do not participate in those "other ways" because they cannot afford to pay that much money. That was the last time I tried, it's really hard to convince the school and other parents to allow Latinos to have a presence.

Many liaison told us similar accounts, that school administrators, with the goal of being inclusive, discouraged liaisons from accepting or asking for donations that benefited one group of parents only, limiting liaisons' possibilities to craft effective motivational patchworks.

The final service that liaisons assemble to mediate information is to follow up on parents' perspectives on the newly provided information. As Diana, the coordinator of an after-school program, explains, liaisons leverage cultural norms for this purpose: "We call them up to three times before the event. In each call we devote time making conversation with them and then we talk about the event, and remind them that their presence is super important for their kids and for us". Liaisons also make sure to open different channels of communication (e.g., phone calls, Remind messages, or one-on-one conversations) for parents to ask questions about new information. However, stakeholders unfamiliar with these cultural nuances do not always understand why so much effort, time, and resources must be devoted to the endeavor of reminding and answering parents' questions. In Diana's case, the program's partners were only convinced that culturally-shaped reminders were sufficient after seeing parents' high level of attendance to the event.

6.2.3 Expanding their Capacity To Align Worlds. Similarly to other mediators, liaisons need the support of human resources who can either work with them or facilitate content/locations/incentives for their activities [28]. Liaisons use two key mechanisms to ensure the collaboration of others: (1) motivating parents to work with them and (2) establishing a working relationship with organizations outside their institutions to secure resources for assembling patchworks.

Putting together a group of Latino immigrant parents who can work with them is an essential step that most school liaisons take towards ensuring human support. Engaging parents in volunteering work is, however, not an easy task. Volunteerism in the U.S. tradition is often a unfamiliar idea for immigrants coming to the country [41]. In their countries of origin, Latin Americans, in particular, do volunteer, but do so as an everyday activity that responds to the immediate needs of those closest to them (e.g., family, friends, the church) as opposed to an action for a mainstream community-based organization that helps a particular group of people [52, 75]. For Latino immigrant parents, thus, volunteering at school can make very little sense: teachers and school staff are not part of their close circle, and, more importantly, language and educational-level differences make parents believe there is nothing they can contribute to school. Further, many parents are fearful of participating at an environment they consider so culturally distant from theirs [16].

To convince parents to volunteer, liaisons have to align the dominant culture's notion of volunteering with what parents find valuable. Liaisons often exploit cultural and emotional seams between schools and parents for that purpose. Mariela, for example, tells her parents that volunteering allows them to have a first-hand look of how their children are doing at school. In addition, liaisons try to make volunteering a safe space for parents to be at school: they offer a wide range of volunteering activities that parents can feel comfortable with; and assign locations for these tasks that afford parents with a sense of familiarity. Gisela explains this further:

They come to my office, it is a small place but moms prefer to come here because they feel comfortable. I am here, they know me, and feel at ease. Also, here there are always other moms who can explain the new ones what to do, and they start to know each other more. We always joke around, and gossip while they are here helping out.

Such bonding with liaisons motivates parents to continue visiting the school, progressively developing a relationship with teachers and other school staff that fosters information transfer. Further, it enables liaisons to start delegating more empowering activities to parents, so that they can become more self-reliant in how they navigate their host country. When her school was left with no PTA, Inés ran to her group of volunteering parents and pushed them to become the first and only Latino-ran PTA in the entire district:

I told them, "you have to come and help me cause if you don't, we won't have a PTA". They are usually afraid to lead, to commit to these things. Many only have a 2nd grade level education and feel they have nothing to do running things at school. But they know me and they trust me, so I told them "I'm also afraid of this and don't know how to do it, but we can learn together". Now they organize events themselves, they bring the ideas and decide who is going to do what. I help them, but they are the ones running the show.

The experience of Fabiola, a mom we met during our interview with Gisela, further illustrates the impact that volunteering for liaisons can have on parents:

My girl is no longer in this school, but I still come to help. Here, I've earned people's trust, their affection, and more important than anything, their respect. Thanks to this school I learned English, and every time I needed them, Gisela and the school were there for me. This school is like my second family.

Although such an empowering parent-liaison relationship is desirable, it is not always possible. Not all parents can or feel the motivation to volunteer. A pending question for HCI would be where and if technology could have a role in remotely empowering parents who cannot attend school.

Liaisons frequently need to connect with organizations beyond their institutional boundaries to secure resources beyond volunteers. Our data highlights two particular mechanisms they use for bridging social capital: (1) they harness institutional contacts and (2) find new contacts on their own, going great lengths for establishing a long-term working relationship with them.

Within the institutions where liaisons work, like schools, there are actors whose responsibility is to find contacts from the outside world and forward those to liaisons (e.g., the school principal; school's media center specialist; and the liaisons' coordinator). Many of the liaisons we interviewed only harnessed these contacts to support their work. However, this mechanism depends too much on other people and thus, it can limit liaisons' capacity to think about new services to offer.

A handful of liaisons chose to "tomar la batuta" (take charge) instead, and build social capital for their institutions on their own. This requires them to go beyond their institutions and connect with new organizations. Often it requires a willingness to try new things as opportunities arise both within and outside of institutional limits, and even if the connection to education is not apparent immediately. Mariela's case explains this further:

I say yes to all organizations that come to the school to offer their services. For example, a cultural organization from Guanajuato offered the visit of a Mexican plastic artist. I said "yes!" but I did not really know how to use it at school. With my volunteer parents, we decided to ask the artist to teach parents how to craft piñatas. We then offered these piñatas as prizes for kids who got really good grades over the year.

Making these connections is essential but liaisons must also work towards maintaining them. Mariela, for example, calls on her largest community partners regularly, and re-introduces herself with a card and chocolates whenever there has been a change in staff. Many liaisons, however, reported feeling that, achieving these connections was not possible in their communities, which they felt had more difficult problems to tackle. Further, some reported they had tried to do these activities but stopped due to the lack of support of their schools' administration which did not allow them to take donations from outside organizations or to seek out for opportunities exclusively for Latino immigrant families. Our analysis suggest that identifying ways for liaisons to find and maintain new contacts could greatly help their work. The institutional limitations they face, however, indicate there is a need to make the potential impact of their work more visible.

7 DISCUSSION

Vertesi's language of seams [88] allowed us to uncover the multiple, often ad-hoc, services that liaisons offer to parents, educational institutions, instructors, and supporting organizations. We now discuss lesson learned both about liaisons and the potential of Vertesi's lens for understanding the work of information mediators. From there, we propose opportunities for technology to amplify liaisons' capacity to support parents.

7.1 Using the Language of Seams to Understand Mediators: Lessons Learned

To understand the work of liaisons as information mediators, we drew on Vertesi's language of seams [88]. She proposed this metaphor as an analytical tool that sheds light on people's ad-hoc efforts to align multiple, heterogeneous, physical and digital infrastructures (e.g., Facebook, Twitter, Phone 3G coverage) for satisfying their information needs. Our use of this language demonstrates it is also a productive lens for unearthing many aspects of information mediators' work that tend to remain invisible. In particular, Vertesi's language is useful for illuminating (1) all the worlds that mediators impact with their work (2) all the services they offer, from the most obvious to those often invisible to institutional decision-makers, and (3) the potential in the seams in-between worlds to further support mediators' work.

7.1.1 Aligning Multiple Worlds. Research on mediators has traditionally reported on how they act in-between two worlds, transforming information or enabling technology access for those less dominant [11, 28, 29, 65, 73, 76]. Vertesi's emphasis on multiplicity of systems allows us to see mediators in a different light, as people working at the margins of *many*—instead of only

two—different worlds. This provides a yet deeper understanding of the scope of their mediation work, thereby, broadening opportunities to support their own information needs. For example, we saw that liaisons interacted with and impacted the world of non-immigrant parents. These parents were often curious about their Latino immigrant counterparts, and saw them as a potential source of knowledge (e.g. for learning Spanish). While many incompatibilities prevented this alignment on an everyday basis, by being in the middle, liaisons were able to leverage that curiosity for enabling cross-cultural sharing moments. However, more can be done to augment those moments. Vertesi's approach to multiplicity also allowed us to see how liaisons mediated between educational institutions and supporting organizations. Organizations provide liaisons with all kinds of resources for their institutions/parents, and liaisons inform them about parents' actual needs. By analyzing this relationship we unpacked the different mechanisms that liaisons, as mediators, use for connecting with these organizations as well as the possible role of technology for that matter. This account of bilingual liaisons, in turn, provides a novel contribution to the literature on mediators, which has previously reported on their need for social capital [28, 74], but had not yet described how they develop and leverage social capital to bridge different worlds.

7.1.2 Patching Patchworks for Offering Multiple Services. As mentioned before, most CSCW efforts to understand mediators' work have been on individuals offering one clear-cut service to a particular audience [1, 28, 29, 65, 74, 95]. Vertesi's call for focusing on individuals' work with and across multiple worlds revealed much more about the services mediators can offer. It provided a process for iteratively uncovering multiple services from the most obvious, to those often invisible to institutions. We conclude that mediators such as liaisons, are in permanent creation of patchworks to support new services and that no service can ever be seamless for all the audiences they mediate. For example, when Inés saw the seamful interaction between Latino parents, schools, and school-sanctioned communication technologies, she created a new patchwork; that of a private, hyper-localized communication via *Remind*. Since the patchwork was still seamful for some parents (not all understood how to register in the platform), she assembled yet another patchwork for providing a following-up service to each parent. Vertesi's focus on moments of seamfulness provided a process for us to unpack a broader range of services, some of them hard to see as part of a mediators' work (e.g., liaisons offering their own cars for ensuring parents attend school events).

Vertesi's emphasis on patchwork assembling also highlights the ways in which mediators' work can be thwarted. For example, while many liaisons leveraged *technology, information, and people* to align worlds, not all of them could. Personal as well as institutional limitations (e.g., schools efforts to strive for equity) prevented them from engaging in many alignment activities. Such detailed understanding of services, the elements that support them, and the ones that limit them can, in turn, prompt a series of design directions hard to see otherwise (e.g., finding ways for new technology to support liaisons' follow-up services, and designing for persuading institution decision-makers).

7.1.3 Exploiting Seams as Resources for Change. Mediators are often described as a bridge acting in-between worlds to make up for inequities [1, 28, 64, 65, 74], which are considered a problem. When talking about gaps in technological systems (e.g. the incompatibility of image formats across presentation tools), Vertesi proposes these gaps (or, as she calls them, *seams*), as an opportunity for patching multi-system solutions [22, 88]. This perspective provided us a new way of looking at the social inequities acting as seams across liaisons' social and technical worlds. Further, by analyzing liaisons' creative actions to leverage inequities as opportunities, we were prompted to reconsider the role of differences when designing for groups at the margins of mainstream society.

The worlds that liaisons mediate are plagued with social inequities. However, we saw how liaisons managing these inequities with much creativity. For example, they leveraged immigrants' fear of deportation and the principal's authority, to bring two worlds together and help both

groups understand emotional, contextual information about each other. Likewise, we saw liaisons leveraging their tacit authority as school staff and their own identity as Latino immigrants, for knowing how and when to switch tones that could facilitate information transfer. This raises an important question for HCI research with less dominant groups, which routinely grapples with inequities and differences: how can traits considered disadvantageous be mobilized to create rich moments of information-sharing that equally privileges highly unequal worlds?

7.2 Designing for Liaisons: Challenges and Opportunities

Kentaro Toyama, in proposing his law of amplification for the field of ICTD, asserts that technology projects in global development are most successful when they amplify—instead of fixing or replacing—successful development efforts [84]. Our analysis suggests that liaisons could be considered as a successful development effort introduced by the U.S. educational system. As we saw, their role is essential in helping their clients (e.g., parents, schools, supporting organizations) achieve particular information goals. However, we also saw them facing key challenges preventing them from reaching their full potential. We now discuss those challenges and propose opportunities for technology to address these limitations and amplify liaisons' potential to disseminate information.

7.2.1 Liaisons' Challenges: Knowledge, Workload, and Visibility. Our analysis highlighted three fundamental limitations hindering liaisons' ability to assemble information-based services. *First*, across liaisons, we saw an unequal distribution of knowledge about resources—including technology—and ideas for offering new services to parents and other clients. This was more the case with liaisons in public schools, who often are at a considerable physical distance from their larger organization (the school district), and operate in areas where access to resources and supporting organizations can widely vary. *Second*, from our analysis, it became apparent that, despite their best efforts, liaisons' work can be too much for one person. Liaisons often serve over 300 parents, and, to be effective, they need to engage in colocated, one-by-one interactions, where closeness to parents can be achieved. *Finally*, liaisons can be highly effective when given autonomy to assemble services (e.g., being able to receive donations that would only benefit Latino immigrant parents). Lack of visibility of how liaisons' work can benefit the entire school community can affect institutions' as well as other parents' willingness to provide the needed freedom to act.

7.2.2 Design Opportunities. Besides highlighting problems, our analysis revealed promising opportunities for technology to support liaisons' work, thereby benefiting parents. Mainly, we propose that technology can support liaisons in (1) forming *knowledge communities*, (2) increasing parents' participation *at a distance*, (3) and conducting more effective *technology intermediation* work.

Technologies like online *knowledge communities* [30] could assist liaisons in organizing their experiences, so that information about rich resources is equally distributed. This has shown to be an effective solution for educators [15, 35, 67]. In liaisons' case, such a platform would need to support them in learning about others' services. For example, an online community could curate liaisons' experiences to offer them periodic suggestions on ideas for services (e.g., how to organize a math workshop) that respond to each liaison's context (e.g., parents' demographics, location, and level of school's support) and interests. Suggestions could include rated details on how other liaisons assembled a service (e.g., content to include, locations to use, organizations that can help, ways to advertise the service). The platform could also provide a map of people/organizations that liaisons could reach out for specific purposes (e.g., teaching a class, getting donations, and so on). As an environment that records liaisons' efforts, a knowledge community could also showcase the benefits of liaisons' work, thereby helping in persuading others to support this work further.

As our analysis showed, engaging parents in volunteering work not only lessens liaisons' workload but enables parents to develop a close relationship with the school based on mutual appreciation

and respect. Volunteer parents, however, are not easy to find. Designing technologies like *volunteer management apps* (e.g., *SignUpGenius*) specifically for parents and liaisons, could help increasing the *participation of parents who are more distant from school*. In our data, many parent volunteers started out with a small task, gained experience and confidence and grew into larger volunteer roles, with some eventually taking on leadership roles. Leveraging this observation, the app could allow liaisons to create micro-tasks (e.g., photocopying homework sheets). As parents complete these tasks, the parent-side of the app could show them a visualization of their impact in the school and the community. Further, as they become more experienced volunteers, it could start suggesting them more complex tasks (e.g., organizing a meeting with parents at their location). This, in turn, could encourage more parents to become invested in the school, increase the quantity and quality of parents volunteer efforts, and reduce some of the liaison's workload.

One of the more relevant but time-consuming tasks for liaisons is *technology intermediation*; to go over how to install and use the entire suite of apps for communicating with the school (*ClassDojo*, *Parent Portal*, email, and such) could take up to an hour per parent, which is hard to scale. Plus, parents who do not attend school rarely know about this service. This signals the need to revamp the design of parent-school communication apps to offer support to parents. For example, *ClassDojo* could alert parents when they have not used it for a while, suggesting someone who could provide support (e.g., the liaison or another volunteer parent). *ClassDojo* could also offer liaisons general statistics of installation and usage so that they can take appropriate action if needed. In a similar line, the school email platform could also issue a report on parents' use of this service. Having access to such information could help liaisons become more effective in their technology intermediation efforts. Further, redesigning school apps to fit the need of immigrant parents would likely benefit a much wider parent audience as well.

8 CONCLUSION

In response to the immense educational challenges faced by low-income families increasingly immigrating to high-income countries, we investigated the role technology might play in supporting the work of bilingual parent-education liaisons, which mediate educational information for these parents. In this paper, we import Vertesi's language of seams from the domain of physical and digital infrastructures to the social and technical worlds in which liaisons operate. The use of this language as an analytical lens allowed us to unpack the artful strategies liaisons use to assemble not one but multiple services. Further, based on our analysis, we devise a set of design recommendations for amplifying liaisons' capabilities as they help immigrants parents in supporting their children's education. Finally, we demonstrate how the Vertesi's lens of seams is a productive approach for expanding how CSCW understands the often invisible work of information mediators.

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